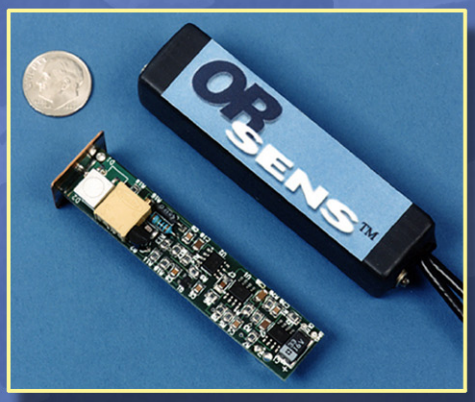
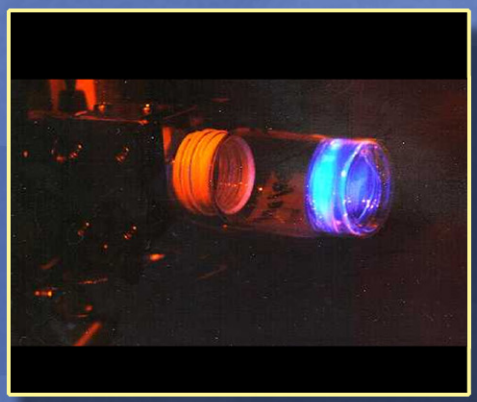
Radiation Sensors



RADSiP photodiode gamma-ray sensor

Cadmium tungstate crystal detector



Organic scintillator photographed by its own light

Y-12 National Security Complex

Gamma-ray sensors

Photodiode gamma-ray sensor units are small, inexpensive hardware systems for individual-item monitoring of radioactive materials. These sensors provide 24-hour surveillance, recording gamma-ray dose rate. They can be retrofitted into existing storage configurations and operated in a fixed or mobile mode. A single +9-V or 12-V supply is required for power. They are sensitive over the range from 20 keV to 200 keV.

Neutron sensors

Neutron sensors are an important component in monitoring nuclear material because the detection of neutrons indicates the presence of spontaneously fissioning isotopes and induced fissions. The gadolinium-loaded solid organic scintillators offer ease of manufacture, custom emission spectra, and, with only 1% Gd by weight, 100% efficiency in a 1-cm thickness.

Silicone rubber scintillators

Silicone rubber scintillators have been developed that show better gamma-ray sensitivity than hydrocarbon plastics because of the presence of silicon. Starting materials are inert liquids; a catalyst is required to initiate polymerization. These scintillators can be cast in large pieces and odd shapes at room temperature in the presence of air and in plastic or metal molds. The net assembly cost is less than plastic because they do not require machining and they are ready for use from the mold. Silicone rubber materials can also be safely handled and can be modified with additives to confer neutron and/or enhanced gamma sensitivity.

APPLICATIONS

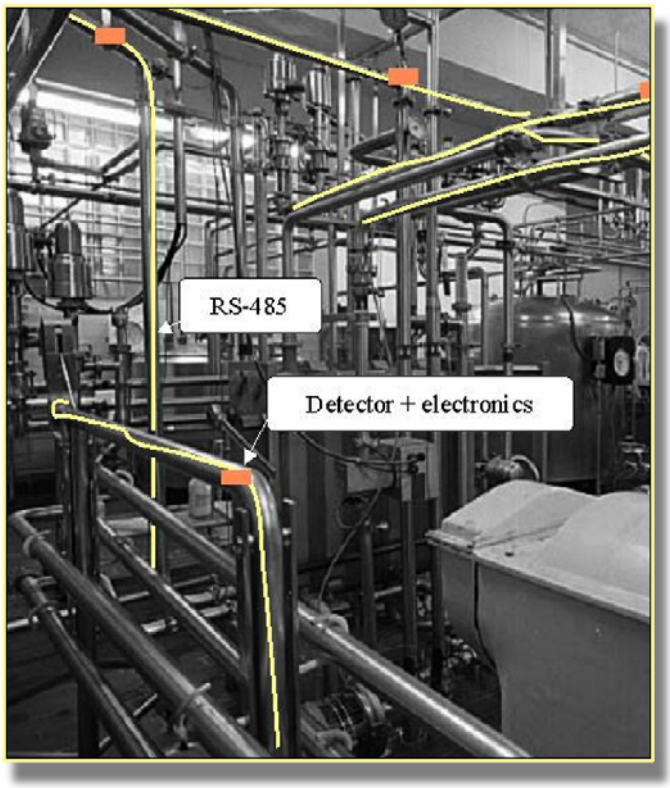
Gamma-ray sensors are an integral component of nonproliferation monitoring, spent fuel safeguards, and long-term monitoring of stored radioactive wastes. Remote Holdup Monitoring is a newly developed use of gamma-ray sensors.

CAVIS™

Gamma-ray and weight sensors are combined for use in the Continuous Automated Vault Inventory System (CAVIS™), a special nuclear materials accountability program. CAVIS™ was designed and built as a low-cost, highly reliable, and user-friendly system for remote inventory assessments. CAVIS ™ provides real-time weight and radiation attribute confirmation from each item.

Remote Holdup Monitoring

Gamma-ray sensors permanently mounted at measuring points allows unattended material accountability to be performed, such as Remote Holdup Monitoring.



Holdup monitoring can now be performed in harsh environments while significantly reducing radiation exposure to personnel and lowering labor costs.

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